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Sent: Thursday, May 10, 2007 11:59 PM
To: WTBSecretary; wchavens@aol.com; jstobaugh@telesaurus.com
Subject: 06-49 filing
Attachments: ITSA-Tel(+date+attchmts)(fml).pdf

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Secretary,
ECFS is not operating properly. I reported this to ECFS help by phone and email. I am thus filing **this** with you to get today's date. This is a letter from and filed on behalf of the Intelligent Transportation Society of America.

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Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

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MAY 10 2007

FCC - MAILROOM

May 10, 2007

Re: WT Docket 06-49. Notice of Proposed Rulemaking Regarding Location and Monitoring Service wide-area Multilateration (LMS-M) Licenses under FCC Rules, Part 90, Subpart M: Intelligent Transportation System Radio Services.

Dear Ms. Dortch:

ITS America requests that the Commission maintain the current rules regarding LMS-M licenses in the above-referenced docket.

The ITS radio services, including LMS-M, and the current LMS-M rules were established by the Commission specifically to provide ITS wireless in the nation: Telesaurus has provided a summary in this regard, as **Attachment 1** hereto. This purpose should be maintained.

Telesaurus Holdings GB LLC and its affiliates, described at www.telesaurus.com (herein together, "Telesaurus") are members of ITS America.¹ As Telesaurus describes in this website, the Telesaurus entities hold, nearly nationwide, LMS-M 900 MHz licenses as well as 217-220 MHz licenses (from 6 to 9 MHz total, depending on the areas of the US), and plan to use these licenses primarily for ITS wireless, and secondarily for complementary environmental monitoring.

We note in addition that Mr. Havens, for Telesaurus, participated in the 2006 ITS World Congress in London, and has, with the California Center for Innovative Transportation ("CCIT") (part of the University of California) submitted a paper, through ITS America, for a proposed presentation at the 2007 ITS World Congress in Beijing. A copy is included as **Attachment 2** hereto. This paper summarizes Telesaurus' plans for wide-area ITS wireless throughout the United States, to ~~fulfill~~ the ITS-specific purposes of LMS-M established by the Commission (described in Attachment 1).

¹ Telesaurus and its President, Warren Havens, commenced participation in our association in 1999, when Mr. Havens initially obtained LMS-M licenses from the Commission, in particular, in the area of ITS wireless. Their contact in ITS America was with Paul Najarian who handled in ITS America, among other matters, ITS wireless, including establishing the DSRC radio service before the Commission. Mr. Najarian left ITS America in 2006. As reflected above, Telesaurus is currently developing its ITS wireless plans with CCIT, also an ITS America member.

The paper, *Attachment 2*, notes on page 1 that a special focus of the Telesaurus contract with CCIT is investigation of tight integration of LMS-M with DSRC.²

The paper, *Affachment2*, also notes on page 3 certain ITS standards involving ITS-specific wireless, including ISO TC-204 (communications) and TC 211 (location and GIS) (referenced, with URL links, in the Telesaurus website).

As the Commission knows, the two ITS Radio Services are LMS in the 902-928 MHz frequency range, of which LMS-M is allocated for wide-area long-range applications, and DSRC in the 5.9 GHz frequency range, for short-range applications.³ In addition, as the Commission knows, ITS America participated in establishing the DSRC radio service, and it previously (when named IVHS America) supported the establishment of the LMS radio services including LMS-M (see *Attachment 1* below, ¶ 21).

We understand that the Commission is considering changes to the LSM-M rules that would impede the use of LMS-M licenses for ITS wireless.⁴

ITS America continues to support these two ITS Radio Services, including LMS-M. ITS-specific wireless is essential for many ITS applications, especially advanced ITS applications being planned. These include all of the applications contemplated by the Commission when establishing the LMS-M service, summarized in *Attachment 1*.⁵

² While ITS America is not monitoring this investigation, ITS America is substantially involved in **DSRC**, and any possible augmentation or support of **DSRC** should be given serious consideration due to the major importance of DSRC to advanced ITS in the nation. We understand from Mr. Havens that he and CCIT will publish the results of their investigation, and are pursuing this with intent to advance the ITS stakeholders community.

³ Commission Rules, at 47 C.F.R. §90.350, provides (emphasis added):

90.350 Scope. The Intelligent Transportation Systems radio service is for the purpose of integrating radio-based technologies into the nation's transportation infrastructure and to develop and implement the nation's intelligent transportation systems. It includes the Location and Monitoring Service (LMS) and Dedicated Short Range Communications Service (DSRCS). Rules as to eligibility for licensing, frequencies available, and any special requirements for services in the Intelligent Transportation Systems radio service are set forth in this subpart.

⁴ We understand from Telesaurus that the proposed changes would, in sum: (i) no longer require the ITS-specific forms of wireless location and communication required under current rules (primary service to vehicles, vehicle location requirement, data communication to support ITS applications, etc.), and (ii) reduce technical allowances such as authorized transmission power and/ or time of use. We understand from Telesaurus that its experts have determined, and explained in this docket, that such changes would block or be highly detrimental to their plans to use their LMS-M licenses for ITS wireless, and also would allow other LMS-M licenses (or their successors in interest) to exclusively pursue non-ITS wireless.

⁵ Since these ITS applications are publicly documented and well known, they will not be summarized here. Besides descriptions in *Attachment 1* (from the mid-1990's perspective), the websites of ITS America, CCIT, and Telesaurus further describe these applications including more current developments.

While public commercial wireless, and governmental private wireless, play and will continue to play substantial roles in ITS, nationwide ITS-specific wireless properly implemented has many advantages including: higher level of security, optimization for and priority afforded to ITS-specific applications, direct use by and customization for ITS agencies, adoption of and participation in ITS technical standards, substantial preemption by first responders in major emergencies, and nationwide scope, technology and equipment standards, and implementation. Also, securing ITS wireless for long-range development and use in the US will increase the chances for adoption by end users, ITS agencies, automobile makers, and other ITS stakeholders.⁶

ITS is providing and will increasingly provide critically needed benefits to the nation, including reduction in accidents and loss of life and property; reduction in traffic pollution and congestion, and related improvement in quality of life; improvement in workforce productivity; support of alternative-fuel transportation and increased national energy independence; and by such transportation-system advances, increased capabilities afforded to the public and public agencies to respond to major emergencies, when transportation systems are especially important. The existing ITS Radio Services—both LMS and DRSC—wisely established by the Commission, should be fully supported and maintained by the Commission and in no case adversely amended or diverted to other purposes.

Accordingly, **ITS America** requests that the Commission maintain the current LMS-M rules to allow LMS-M licensees to develop and provide ITS wide-area radio services in the nation. There are many other commercial and private radio services in which other, non-ITS-specific wireless can be provided. However, there is no other radio service established for such wide-area ITS-specific wireless, as the Commission explained, in *Attachment 1*.

Respectfully,



Neil Schuster
President and CEO
ITS America

Attachments

⁶ We understand from Mr. Havens that the Telesaurus entities have firmly committed, including in FCC filings (in LMS-M, DSRC, and other dockets) to using the Telesaurus LMS-M and 200 MHz spectrum for ITS purposes, and have commenced a nonprofit foundation, Skybridge Spectrum Foundation (see the Telesaurus website) to further secure and support this ITS commitment.

LMS-M, the Wide-Area ITS Radio Service

Excerpts from the FCC Order FCC 95-41 establishing LMS-M

Prepared by Telesaurus Holdings GB LLC and affiliates.

In the following excerpts, highlighting and underlining are added, and footnotes in original are deleted. The following excerpts are from:

Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems

77 RR 2d 84, 10 FCC Rcd 4695, 1995 FCC LEXIS 763
(February 6, 1995)

FCC 95-41. PR Docket No. 93-61
Released: February 6, 1995. Adopted: February 3, 1995

REPORT AND ORDER

1. In this Report and Order, we adopt rules for the future licensing and continued development of a number of services and equipment using the 902-928 MHz band. In recent years, **Automatic Vehicle Monitoring (AVM) systems** and unlicensed Part 15 devices have developed and proliferated in this band and are providing services that are valuable and in the public interest. These services range from licensed vehicle location and automatic toll collection systems to unlicensed devices used for utility **meter reading and inventory control**. Our allocation plan for the 902-928 MHz band includes **8 MHz of additional spectrum for AVM services** and establishes new provisions for governing the interference obligations of Part 15 and amateur operations in this band. This plan balances the differing operational needs of these varied types of uses so that most AVM systems and Part 15 devices will be able to achieve their service objectives without impeding each other's use of the spectrum. We also modify and eliminate outdated regulations that have not kept pace with the technological evolution of AVM and **establish a new service, the Location and Monitoring Service (LMS), that both encompasses the old AVM service and future advanced transportation-related services.**

2. A key feature of our new spectrum allocation plan is the establishment of separate **sub-bands** for licensed LMS uses. We have provided three sub-bands for exclusive licensing of wideband "multilateration" LMS systems in addition to two sub-bands for the sharing of narrowband "non-multilateration" LMS systems. Subject to grandfathering certain existing AVM licensees, mutually exclusive applications for multilateration LMS licenses in the three sub-bands will be resolved through competitive bidding. We also clarify the status of licensed systems in the 902-928 MHz band in relation to other uses of the band, with distinctions made for amateur radio and unlicensed Part 15 users operating under certain specified parameters. **The new band plan**, combined with the provisions for continued amateur and

Part 15 operation, will allow efficient and competitive use of the spectrum. Our decisions herein also provide certainty for all users of the band so they can invest in the equipment and facilities necessary to bring quality, low cost services to consumers.

* * * *

3. The Commission initiated the AVM service in 1974 when it adopted its Report and Order in Docket No. 18302-1. In the 1974 Report, we found that AVM had the potential to accommodate a number of important functions, such as tracking and monitoring large fleets of vehicles and providing information to allow more efficient use of vehicles through better dispatch and routing information.²

5. It is expected that in the coming years both types of LMS systems will play an integral role in the development and implementation of the variety of radio advanced transportation-related services, known as "Intelligent Vehicle Highway Systems" (IVHS) or "Intelligent Transportation Systems" (ITS).⁹ The ITS is a collection of advanced radio technologies that promise to improve the efficiency and safety of our nation's highways, reduce harmful automobile emissions, promote more efficient energy use, and increase national productivity.¹⁰ For example, it is anticipated that ITS systems will increase traffic mobility and efficiency by notifying drivers of traffic congestion and recommending alternate routes, adjusting the settings of traffic signals to prevent anticipated traffic accidents and providing navigational assistance to direct a car to its destination according to the most efficient route. ITS warning systems can also be used to notify drivers of impending collisions (or even take control of the vehicle to avoid a collision) and display electronic traffic and safety signals on a car's windshield when poor weather conditions impair drivers' vision of road conditions. It is estimated that ITS will help reduce air pollution caused by automobiles and will cut wasteful fuel consumption. Traffic congestion, which costs the U.S. \$100 billion annually in lost productivity, will also be minimized by innovative ITS traffic management technologies. Finally, ITS is expected to create new economic and employment opportunities. Not all of these services, however, require or rely on the use of the 902-928 MHz band.

To recognize the expected growth of ITS, this Report and Order creates a new subpart in Part 90 for Transportation Infrastructure Radio Services (TIRS). The Location and Monitoring Service (LMS) which uses the 902-928 MHz band, constitutes the first service contained within the TIRS. As we allocate additional spectrum or create new services intended to further the efficiency of the nation's transportation infrastructure, these new services will likely be regulated under the TIRS.¹¹ The TIRS will thus further Congress's goal of encouraging ITS by providing an organized and unified approach towards regulating spectrum for ITS-related services. Today's creation of the TIRS clearly demonstrates this agency's commitment to the continued integration of radio-based technologies into the nation's transportation infrastructure and our commitment to the development and implementation of the nation's intelligent transportation systems of the future.

* * * *

12. In this Report and Order we have therefore made the following decisions:

Change the name of this service from the Automatic Vehicle Monitoring (AVM) to the Location and Monitoring Service (LMS) (see paragraph 1).

Change the terminology used to refer to the two general categories of LMS technologies from "wideband" and "narrowband" to "multilateration" and "non-multilateration," respectively, (see paragraph 14).

Permit multilateration LMS systems to locate any object -- animate or inanimate -- ancillary to their primary vehicular location and monitoring services (see paragraph 24).

* * * *

16. Notwithstanding these concerns, we believe that delaying implementation of permanent rules for LMS systems could jeopardize the continued development of this service. Although a number of companies have already developed LMS systems and are on the verge of making services widely available, they argue that uncertainty about possible changes in our rules has deterred or prevented them from committing greater capital or obtaining financing.³⁵ In addition, LMS equipment manufacturers, state and local government entities, toll road operators, and Part 15 manufacturers and users require regulatory certainty. Further postponement of final decisions regarding our LMS rules would make it difficult for users of the band to plan the long-term development of their products or services.³⁶ Establishing permanent rules for LMS will also provide opportunities for new entrants into location and monitoring businesses. Accordingly, we find that it is in the public interest and consistent with Commission precedent to adopt permanent rules for location and monitoring services.

* * * *

18. We conclude not only that the 902-928 MHz band should continue to be made available for LMS services, but that the 8 MHz within the band not previously allocated to AVM should also now be available for LMS. Although prior AVM operation in the band has occurred under interim rules, we have always regarded the band as a permanent home for AVM.⁴⁰ The 903-912 and 918-927 MHz segments of this band are currently the only spectrum specifically allocated for AVM use and there exists no other low-cost, consumer-oriented spectrum where AVM service providers operate their systems without facing concerns similar to those present in this band. **The 902-928 MHz band is ideally suited for location services due to the propagation characteristics of the band that permit widespread coverage of a market area without the use of an inordinate number of base stations.** In addition, while some commenters argue that GPS or terrestrial-based communications systems with location capabilities are more spectrally efficient,⁴¹ we are not persuaded that LMS should be eliminated from the 902-928 MHz band on this basis. The alternative technologies put forward by commenters have disadvantages as well as advantages in comparison to LMS. For example, GPS and LORAN-based systems used in fleet tracking permit a vehicle to determine its location, but a separate communications link is required to transmit this information back to a dispatch location. Similarly, Lojack, Inc. (Lojack) manufactures a vehicle location system that operates on a single channel in the 170 MHz band, but this system requires use of direction-finding antennas to locate the vehicle. **By contrast, multilateration LMS systems use larger amounts of spectrum, but can both receive "fixes" on large numbers of vehicles and transmit messages back to such vehicles from a central source -- all within one integrated system.**

19. We further conclude that the public will be best served by expanding the current AVM allocation of 18 MHz to include an additional 8 MHz so that LMS will be permitted to use the entire 902-928 MHz band. **This will allow development of diverse LMS services and technologies.** LMS providers are already developing systems with differing capacities, and future designs may surpass the capacity of systems available today. In addition, we believe that developing a diversity of LMS services is important to promote competition and

continued technological advances. Promoting alternative technologies will provide consumers choices of a variety of locating services, enabling them to address their individual communications needs. **The demand and need for greater capacity, capability and alternatives will grow.** Thus, providing additional spectrum for LMS systems within the 902-928 MHz band allows for development of the full scope of location and monitoring techniques.⁴²

* * * *

21. In response to the Notice, providers of multilateration LMS services contend that there are significant potential public benefits to expanding LMS beyond vehicle location alone.⁴⁸ Southwestern Bell Mobile Systems (SBMS) urges that the definition of LMS be further expanded to permit messaging and data transmissions to fixed units and units for which location and monitoring is not being provided.⁴⁹ Additionally, certain multilateration providers have requested that it be made clear that LMS will be permitted to provide interconnected service to the public switched network (PSN).⁵⁰ Other commenters, however, such as **IVHS America [now ITS America] and the United States Department of Transportation (DOT), argue that LMS should remain primarily a vehicle-oriented service, with an emphasis on ITS-related communications.**⁵¹ Part 15 manufacturers and users and amateur operators also contend that expansion of the possible uses of LMS will result in more intensive use of the band, thus leading to severe spectrum congestion.⁵²

* * * *

24. Accordingly, we will allow non-vehicular location services to be rendered only by multilateration LMS systems whose **primary operations involve the provision of vehicle location services.** This limited expansion of permissible LMS uses recognizes the limited capability of multilateration systems to cover a wide area and perform location determinations for any type of object within that area. * * * *

25. While we expand the potential applications of LMS as stated above, we decline to allow LMS to be used for the messaging proposed by Southwestern Bell. We agree with numerous commenters who argue that **creating such a broad messaging and data service would be an inappropriate use of this spectrum.**⁵⁶ **The LMS service is a mobile [vehicle] location and monitoring service.** We do not intend to expand use of this band so that it becomes primarily a fixed, point-to-multipoint or point-to-point messaging service. Our rules make adequate provision elsewhere for this type of communications.⁵⁷ **The 902-928 MHz band, however, is the only allocation for location services that provides sufficient spectrum to accommodate the types of advanced location and monitoring systems currently being implemented.** Although there are other methods and spectrum available to determine the location of a unit, these **other methods do not offer the same capabilities or potential** as systems developed in the 902-928 MHz band.⁵⁸

26. We do not intend for this service to be used for general messaging purposes. Accordingly, we will require that all messaging be associated with the location or monitoring of the vehicle or unit. We will permit communications necessary to provide status and complete status and functional information relating to the vehicle being located or the occupant(s) of the vehicle, including voice communications. Thus, LMS systems will be permitted to transmit status and instructional messages, either voice or non-voice, so long as they are related to the location or monitoring functions of the system. **We find that such use of LMS will be invaluable to the implementation of ITS of the future.**⁵⁹

* * * *

28. Finally, we find it in the public interest to allow LMS licensees to make service available to individuals and the Federal Government in addition to Part 90 eligibles. This step will effectively enable LMS operators to serve all members of the public, thus increasing the potential for the public to benefit from the expansion of ITS services. **In addition, because many LMS systems will entail construction of extensive infrastructure over wide geographic areas [for the required ITS wireless], we also find it in the public interest to permit LMS to be offered to paying subscribers. By permitting LMS offerings to be structured as commercial subscriber-based service, we afford licensees a realistic means of underwriting system development.**

* * * *

39. We believe that the procedures described above afford the best opportunities for amateur, Part 15 and multilateration LMS operations to coexist in the 902-928 MHz frequency band. * * * *

* * * *

46. We believe that both multilateration and non-multilateration systems will play an important role in achieving a **nationwide ITS infrastructure and that a sufficient amount of spectrum must be available** to enable both types of systems to develop. * * * *

* * * *

81. In comments, a number of parties to this proceeding have expressed the desire and need for additional testing to demonstrate the feasibility of multiple services coexisting in the 902-928 MHz band, in particular the multilateration LMS users and the operators of Part 15 devices. **Our record contains a significant amount of information on the issue of mutual coexistence between these parties, which was submitted in the form of theoretical analyses, demonstrations and testing (See Appendix B).** This record shows that certain combinations of elements of these various systems and services create a greater potential for interference than others.¹⁸⁰ The band plan adopted in this item was crafted on the basis of this extensive record. In addition, these submissions were used to establish technical limitations or criteria on the operations of the various systems, to minimize the potential for interference and provide a more conducive environment for sharing of the band by the disparate services.

82. The record of this proceeding contains substantial technical analysis supporting the band plan we now adopt. We are persuaded, however, that additional testing could provide users of the band with data that could contribute to "fine-tuning" system operations. Therefore, to ensure that the coexistence of the various services in the band is as successful as possible and to identify whether further refinements in our rules are necessary, we will condition grant of each MTA multilateration license on the licensee's ability to demonstrate through actual field tests that their systems do not cause unacceptable levels of interference to Part 15 devices. To provide such protection and to facilitate band sharing and minimize interference to Part 15 operations, multilateration licensees may employ any one of a number of technical refinements, i.e., limiting duty cycle, pulse duration power, etc. **It is our expectation that such testing be accomplished through close cooperation between multilateration systems users and operators of Part 15 systems.**

* * * *

93. As discussed earlier,²⁰⁷ we will limit the maximum ERP of multilateration LMS system narrowband forward links, which operate between 927.250-928.000 MHz, to 300 watts. However, we will limit maximum power for transmissions of multilateration system base and

mobile stations outside the 927.250-928.000 MHz sub-band to 30 watts maximum ERP * * *

IV. CONCLUSION

99. Given the plethora of diverse users that share the 902-928 MHz band, this has been an especially difficult proceeding. While we strongly support and wish to encourage the continued development and deployment of an LMS industry, we also recognize the valuable services being provided by other users of this spectrum. We believe that the rules we have adopted herein fairly balance these diverse interests. While we have not been able to satisfy all of the concerns of all of the parties in this proceeding, we reviewed extensive comments and replies to the Notice as well as a very large number of ex parte filings in this docket and serious consideration was given to each position. Given the diverse and often mutually exclusive interests of the many parties that participated, our decisions were the best that could be achieved. **The rules will allow for the continued growth of LMS services and advance Congress' goal of developing an intelligent transportation system infrastructure.** At the same time, we have attempted to ensure that other users of the band, including Amateur operators and users of Part 15 devices, will be able to co-exist with LMS.

* * * *



14th World Congress on Intelligent Transport Systems
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Email your 2-3 page paper, as a Word or Acrobat document (maximum size 5 megabytes), along with this form, to Tom Costello tcostello@itsa.org at ITS America by March 21st.

ITS WIDE-AREA WIRELESS NETWORKS

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ABSTRACT

The California-based consortium of Telesaurus LLCs and related nonprofit foundations have acquired FCC radio spectrum licenses throughout the United States for wide-area location, data, voice, and other intelligent transportation systems (ITS) services. Telesaurus intends to partner with government, power utilities and other infrastructure enterprises to offer nationwide wireless ITS services. The California Center for Innovative Transportation (CCIT) is investigating such wide-area wireless ITS networks from public-policy, technical, and economic perspectives. This paper presents the methodology and some early findings. Of particular interest is the possible tight integration between wide-area and short-range ITS wireless networks, specifically Dedicated Short-Range Communications (DSRC).

MAIN TEXT (DRAFT)

INTRODUCTION

Background

Over the past several years, a Berkeley California based consortium of Telesaurus LLCs and the related nonprofit Skybridge Spectrum Foundation (together “Telesaurus”), has acquired substantial radio spectrum in the lower 200 MHz and 900 MHz “LMS” ranges authorized for use in the vast majority of the United States (US) for location, data, voice, and other intelligent transportation systems (ITS) services (under Title 47 CFR ~~Part~~ 90 Subpart M). The California Center for Innovative Transportation (CCIT), which focuses on the deployment of transportation technology, and works with researchers, public agencies, and innovative companies, is investigating how this spectrum can be leveraged to deploy wide-area wireless networks for ITS services.

Vision

The vision that drives the present investigation is a standards-based nationwide ITS-specific wireless network providing ITS services with applications for commuters, travelers, government, commercial fleets, transportation operators, first responders, as well as position, navigation, and timing services. Envisioned network functions include:

- Mobile, high-speed, location-specific, continuous one-way broadcasts of weather, road conditions, traffic, traveler information, emergency alerts, and possible advertising and entertainment. The received data would be stored and retrieved by users through onboard Telematics devices based on their choices;
- Mobile, variable-speed, two-way data between vehicles and the network, for vehicle location and status reporting to the network, and other ITS-specific exchanges;
- TDOA-based terrestrial multilateration to enhance coverage, accuracy, and reliability of the Global Positioning System (GPS), by correlating wide-area terrestrial pseudolites and spaced based systems. This system could also provide a back-up to GPS if it becomes jammed or spoofed;
- Emergency preemption of substantial capacity by government emergency response authorities to broadcast critical information, monitor and control traffic, etc;
- The ITS systems, focused on principal and eventually secondary roadways, could provide fixed wireless data for environmental monitoring in urban and rural regions.

* [Draft for submission purposes noted in the transmittal **sheet**.]

Scope

In partnership with Telesaurus, the goal of the CCIT investigation is to explore the concepts and key features of a wide-area wireless network that would serve transportation and related sectors. Providing ITS services and applications over such a network is an ambitious project that raises a set of fundamental questions: A) What exact services and applications would be provided? B) What technologies would enable the network? C) What value would the network add to existing and planned ITS services and initiatives? D) Who would support or partner to realize the initiative and how?

Answering those questions requires not only analyzing technical and business elements, hut also factoring in stakeholders' perspectives, including local and state transportation authorities, the FCC and US DOT, established ITS companies, wireless equipment manufacturers, automobile companies, and the likes.

AREAS OF INVESTIGATION

At this phase of the program, the investigation concentrates on concept exploration to assess the technological, economic, business, and institutional feasibility of the network. We **start** with needs, then look at technology, and ultimately intend to outline deployment steps.

Determine **Network** Services

The first question to be asked is what needs or opportunities would the network fill. A wireless network providing wide-area, core ITS services may enhance the safety and security of the transportation system, ease congestion, and reduce pollution in significant ways. The proposed network may provide services to three major groups—the traveling public, transportation operators, and public safety agencies. **All** three groups currently consume various wireless services, and in order for the proposed network to improve the value delivered to each group, it **is** necessary to understand current utilization. We will therefore survey and classify existing and planned services to potential users and extrapolate to determine how an ITS-specific wide-area wireless network would add value, either by enhancement or introduction of services.

Technology and Standards

This area of investigation consists of surveying current and developing technologies and evaluating which are best positioned for the envisioned network. The choice of wireless protocols and related technologies will substantially influence what services can be offered on the network. The set of requirements and constraints to be considered include: signal modulation, priority settings, privacy, mixing multiple services and user categories, maintaining bandwidth and reliability, terrestrial-GNSS, etc. We will review technical standards such as ISO TC 204 and 211, CVIS, GMT, mobile wideband digital broadcast, wide-area pseudolites, TETRA releases, integration with commercial wireless networks, WiMax, WiFi, MIMO, etc.

Implementation and integration into existing **ITS** landscape

Implementation in the **ITS** world requires more than technology. Identified needs, funding, champions, user acceptance and institutional support is the name of the game. A key implementation question underling the development of a wide-area **wireless ITS** network is how the network will complement, enhance or replace other networks, existing or planned. This includes the Federal Vehicle-Infrastructure Initiative (VII), networks deployed by state and local transportation authorities, commercial cellular networks, **GPS**, outfitting government fleets, and other future networks such as municipal broadband and 4C. A clear picture of the interactions with these other networks will be required to move forward.

Another key aspect of the implementation strategy is the necessity to deploy the system in successive, scaled stages. This is necessary because the proposed network concept is large, pervasive, and depends on the adoption and attachment of add-on third-party services. Therefore the analysis will separate what can be accomplished quickly from the longer-term vision, and establish a path between those two points.
